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THE ETIOLOGY OF PEMPHIGUS CONTAGIOSUS IN THE TROPICS.*

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DERMATOLOGISTS will no doubt continue to disagree upon the classification of the various forms of Pemphigus, until this has been placed upon a satisfactory etiological basis. Perhaps the following classification, modified from that of Peter,¹ is as satisfactory as any:

Pemphigus	{	1. Chronic forms, proper pemphigus (Hebra), Pemphigus vulgaris and foliaceus.				
		2. Acute febrile pemphigus.				
		<table> <tr> <td>Pemphigus</td><td>{</td><td>"Pemphigus neonatorum."</td></tr> <tr> <td>contagiosus</td><td>{</td><td>"Impetigo contagiosa" (?).</td></tr> </table>	Pemphigus	{	"Pemphigus neonatorum."	contagiosus
Pemphigus	{	"Pemphigus neonatorum."				
contagiosus	{	"Impetigo contagiosa" (?).				

Concerning the etiology of the diseases in the first group nothing is known.

We shall discuss the second group but briefly, and only in relation to the cases we have to report, without attempting to give a complete critical review of the literature upon the subject.

Acute febrile pemphigus may be considered a specific infectious disease, due to the diplococcus first described by Demme.² His observations have been confirmed by a number of workers, among them Bleibtreu,³ Pernet,⁴ Pernet and Bulloch,⁵ Whipham and Wells,⁶ Hadley and Bulloch,⁷ Hamburger and Kubel,⁸ and Eustis.⁹ The frequency of its occurrence in butchers, and its possible origin from lower animals are discussed by Pernet. Its apparent relation to foot and mouth disease of cattle, as deduced by Bowen,⁹ is rather far-fetched in view of the work of Löffler and Frosch on the latter

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¹*Berl. klin. Wchnschr.*, 1896, 33, p. 124.

²*Verhandlungen des Congresses für Innere Medizin*, Wiesbaden, 1886.

³*Berl. klin. Wchnschr.*, 1893, 30, p. 671.

⁴*Brit. Med. Jour.*, 1895, 2, p. 1554.

⁵*Brit. Jour. Dermatology*, 1896, 8, p. 157.

⁶*Lancet*, 1896, 1, p. 1220.

⁷*Ibid.*, 1899, 1, p. 1219.

⁸*Johns Hopkins Hosp. Bull.*, 1903, 4, p. 63.

⁹*Amer. Med.*, 1904, 7, p. 634.

¹⁰*Jour. Cutaneous Dis.*, 1904, 22, p. 253.

disease (1897). The fact that the diplococcus of Demme is nonchromogenic, retaining its diplococcus form and arrangement, or appearing in short chains, in ordinary broth cultures, is sufficient to distinguish it from the following diplococcus.

Almquist¹ isolated from a series of cases of Pemphigus neonatorum a diplococcus which he named *M. pemphigi neonatorum*. This organism appears as diplococci (0.5 μ) in the contents of the blisters. Upon artificial media it closely resembled a control culture of *Staphylococcus pyogenes aureus* isolated from a carbuncle, growing like a yellow streak of paint on agar, liquefying gelatin, and producing turbidity with a yellow deposit in broth. It grew well at 20° C., but poorly at 15° C. The pigment production varied, as it often does in the case of chromogenic microorganisms.

Using cultures grown for about 20 days upon artificial media, Almquist performed inoculation experiments upon himself, under conditions which leave no doubt that he was dealing with the etiological factor. Typical blisters, 1 cm. in diameter, or slightly larger, were produced, and the microorganism recovered in cultures. Almquist points out that, although his culture resembles that of the yellow pus coccus, it differs essentially in its action upon the human tissues, the process always remaining superficial, and resolution taking place without scarring. The superficial and non-febrile nature of the disease militates against the idea of a blood infection. One examination proved negative. Cultures dried on silk threads were viable after one and a half months. He concluded that the tenderness of the new-born makes it more susceptible, and that the contagion is transferred mechanically from one person to another.

There is considerable evidence in support of the statement made by Kunt Faber, in 1890, to the effect that Pemphigus neonatorum and Impetigo contagiosa should be classed as identical diseases, under the common name of Pemphigus contagiosus. Matzenauer² made a histological and bacteriological study of both Pemphigus neonatorum and Impetigo contagiosa, and concluded that they were identical. However, he considered that the organisms which he isolated were staphylococci, indistinguishable from the *Staphylococcus pyo-*

¹ *Ztschr. f. Hyg.*, 1891, 10, p. 253.

² *Virchow-Hirsch, Jahrb. d. ges. Med.*, 1900, 2, p. 549.

genes aureus. Leiner¹ studied cases of Pemphigus contagiosus in association with measles. He was successful in producing Impetigo contagiosa in an individual inoculated from the blisters of a case; and since organisms which he considered to be staphylococci were isolated from both diseases, he concluded that they were identical.

Pemphigus contagiosus has a wide geographical distribution, and occurs in many parts of the tropics—"wherever heat and moisture combine to bring about a state of the skin favoring its development on the infective material being applied." "European children are more prone to it than native children; European adults are by no means exempt, but the native adult is rarely affected."² Many years ago Manson³ noted the presence of a diplococcus in the contents of the blisters, but performed no inoculation nor cultivation experiments.

In 1904 we made bacteriological examinations on five cases of Pemphigus neonatorum occurring in the Civil Hospital, Manila, P. I. Practically every child born in the maternity ward of this hospital contracts the disease during the period of the mother's convalescence. Only the lack of time prevented us from utilizing the abundant material. From all five cases studied by us the microorganism described by Almquist was isolated. It occurred as distinct kidney-shaped diplococci in the contents of the blisters, and appeared quite like *Staphylococcus pyogenes aureus* on culture media, yet showed some features which we think distinctive. We shall not describe these cultures here, as they are identical with the diplococcus described below from a case of Pemphigus contagiosus in an adult.

CASE HISTORY.

June, 1904, Mr. G., American schoolmaster, about 40 years old, stout and in good health, complained of an eruption in both axillæ. He had been troubled with much itching and scratching owing to "prickly heat." About four days ago he noticed a few vesicles forming in the axillæ. These increased in number, and later some appeared on the back of his neck, on the scalp and on the legs.

At present both axillæ are covered with a maculo-papular and

¹ *Jahrb. f. Kinderh.*, 1902, 55, p. 316.

² MANSON, *Tropical Diseases*, 1900, p. 611.

³ *Hong Kong Medical Reports*—reference not accessible.



FIG. 1.

vesicular eruption (Fig. 1). The vesicles, at first minute, rapidly increase to 5 or 6 mm. in diameter, while their contents become purulent. Some are surrounded by an aureola of hyperemia, others

not. On rupture they leave a red, shining, inflamed base. Where the eruption is thickly set, the intervening skin shows a scarlatini-form blush, but this appearance may be due to the minute maculopapular eruption of "prickly heat." The eruption is accompanied by sensations of stinging and itching, and the muscles of the parts feel sore upon pressure. Two of his children had a similar eruption about two months ago. After a few days' treatment with bichloride of mercury washes, followed by a mild dusting powder, the eruption disappeared.

BACTERIOLOGICAL EXAMINATION.

Coverslip preparations from the contents of the vesicles showed an enormous number of kidney-shaped diplococci which apparently were present in pure culture. Many of the organisms were inside of polynuclear leucocytes. In fact, a preparation closely resembled one from gonorrheal pus (Fig. 2). Compresses of bichloride of mercury (1:1,000) were applied, and the surface washed thoroughly with sterile salt solution. Seven successive stroke cultures were made upon + 1 agar

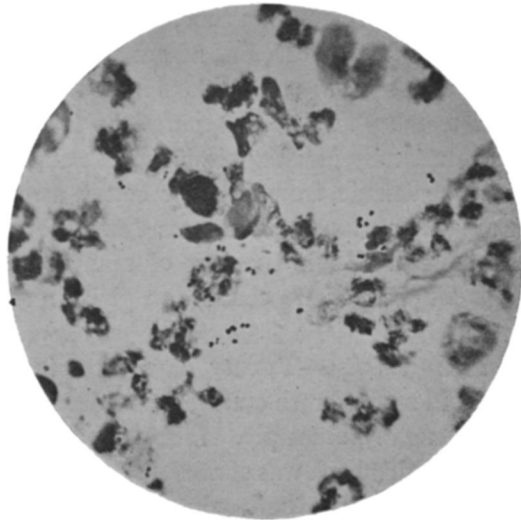


FIG. 2.

slants¹ from vesicles from the right axilla, three from a vesicle in the left, kept at 36-37° C. In 24 hours all the tube were covered with numerous discrete, golden-yellow colonies varying from pin-point size to 0.5 mm. in diameter. On the slants which received the first inoculation the colonies were so numerous that they soon became confluent. Pure cultures from isolated colonies on each set were studied.

¹The media were prepared according to the recommendations of the American committee, excepting that the reaction to phenolphthalein was adjusted by the addition of sodium hydroxide alone. *Amer. Pub. Health Assoc. Rep.*, 1898, 23 p.60.

Biochemical characters.—Upon the ordinary media growth appeared like that of a culture of *Staphylococcus pyogenes aureus* isolated from a case of appendiceal abscess. Litmus milk was coagulated in about a week, and gelatin (final reaction +2) liquefied. No indol could be demonstrated in +1 or -1 broth, nor cholera red in Dunham's peptone solution containing 0.01 per cent KNO_3 , after 10 days' growth at 35-37°. In +1 glucose broth containing one-third part of sterile goat serum, growth appeared with remarkable rapidity, a tube being densely clouded, while control tubes inoculated with *Staphylococcus pyogenes aureus* and *Sarcina lutea* showed only a faint cloudiness. With the formation of acid the serum was precipitated as a dense flocculent mass.

In +1 broth containing 1 per cent of glucose, lactose, and saccharose in the fermentation tube, growth appeared in the closed branch as well as in the bulb, but no gas was produced. No distinct diplococci were seen in preparations from the open and closed branches.

The morphology in preparations from agar and broth cultures was practically indistinguishable from that of pyogenic staphylococci, but when made from milk, or better, serum broth, the diplococcus arrangement found in smears from the vesicle contents was well reproduced. As in the case of many chromogenic bacteria, better pigment production occurred on glycerin and glucose than on plain agar.

Pathogenicity.—Twenty days after inoculation, 1 c.c. of a 48 hour-old serum broth culture was injected into the peritoneal cavity of a 484 gm. guinea-pig. It remained well for a week. Discarded.

A rabbit's back was shaved, the skin sterilized, and small amounts of the above serum broth culture injected subcutaneously. No vesicles resulted, and only small hyperemic areas appeared. These disappeared in a week.

Seven days after isolation (third or fourth subculture), one of us inoculated himself on the forearm. An area on the anterior aspect of the forearm was sterilized with alcohol and bichloride of mercury (1:1,000), followed by thorough washing with sterile salt solution. The point of a needle was dipped into a recent serum broth culture of the diplococcus, and a number of slight pricks were made through the skin. The area was then protected with an aseptic vaccination

shield. In four hours small areas of congestion appeared. In 20 hours these had enlarged. The two largest were about 3 mm. in diameter, and showed minute vesicles about 1 mm. in diameter. In 30 hours these two cloudy vesicles had enlarged to about 2 mm. in diameter, and two more 1 mm. vesicles had appeared. A slight sensation of itching was noticeable. In 48 hours, however, the eruption underwent resolution.

SUMMARY AND CONCLUSIONS.

1. From five cases of "Pemphigus neonatorum" and one case of Pemphigus contagiosus in an adult, micrococci similar to those described by Almquist were isolated.

2. Although occurring as well-defined kidney-shaped diplococci in the contents of the vesicles, the organism may, on superficial examination of cultures, be confounded with *Staphylococcus pyogenes aureus*. Our cultures did not produce indol in broth, and the diplococcus arrangement was reproduced in milk, or, better, in serum broth cultures.

3. A single human inoculation experiment with this organism produced typical but abortive vesicles. The essentially superficial nature of the inflammatory process set up in the human skin—resulting in the exudation of serum and leucocytes, and the formation of vesicles and the absence of any tendency to penetrate into the deeper tissues, certainly differentiate this micrococcus from the ordinary pyogenic cocci.

4. We believe it advisable to call the disease *Pemphigus contagiosus*, whether occurring in children or adults, and the etiological factor would then best be termed *Micrococcus pemphigi contagiosi*.

5. Cases of typical "Impetigo contagiosa" should be examined along similar lines, as the disease described under this name is possibly due to the same microorganism.